Fig. 1

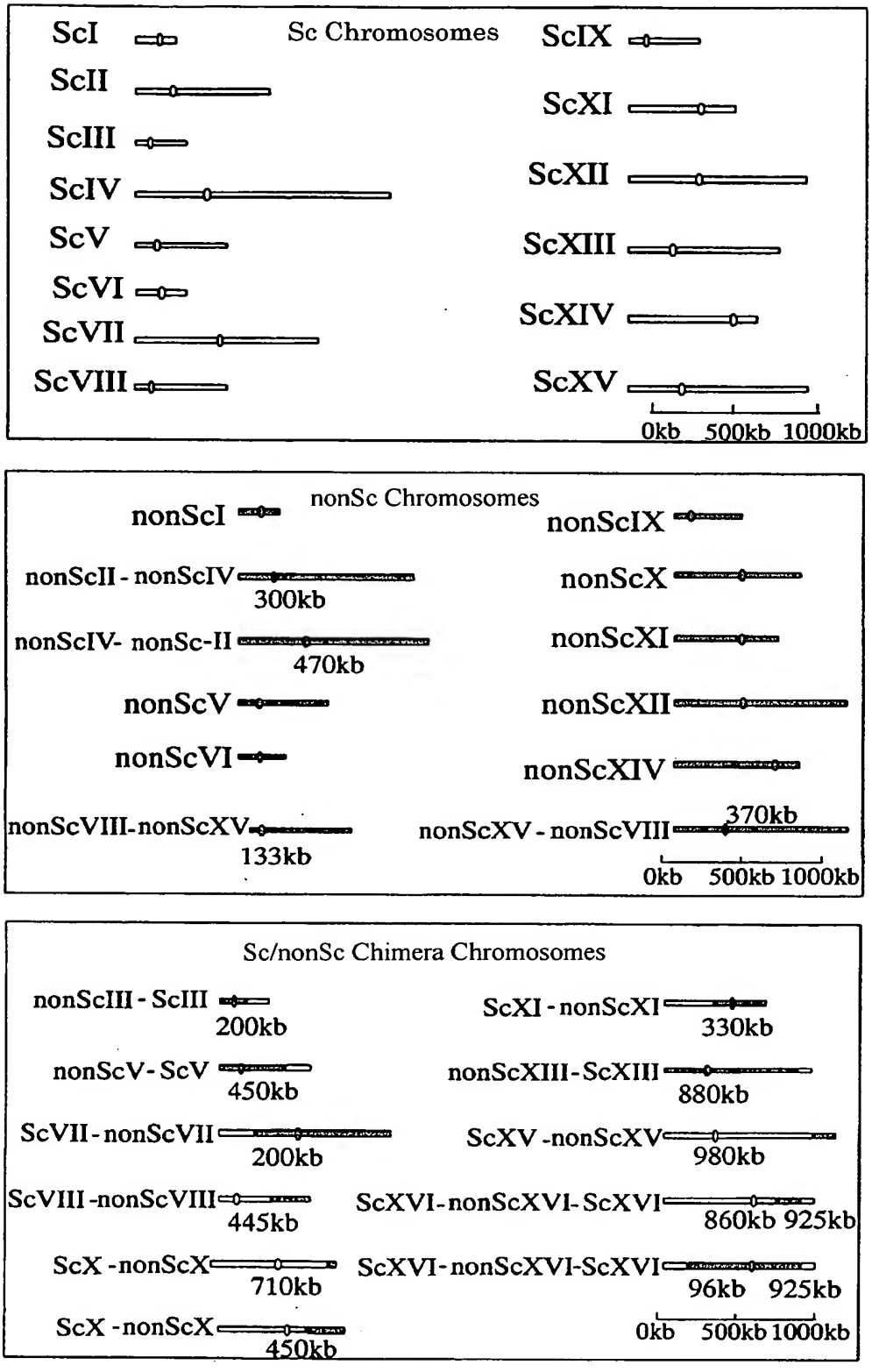

Sc Chromosomes
ScI
ScII
ScIII
ScIV
ScV
ScVI
ScVII
ScVIII
ScIX
ScXI
ScXII
ScXIII
ScXIV
ScXV
0kb 500kb 1000kb
nonSc Chromosomes
nonScI
nonScII - nonScIV
300kb
nonScIV- nonSc-II
470kb
nonScV
nonScVI
nonScVIII-nonScXV
133kb
nonScIX
nonScX
nonScXI
nonScXII
nonScXIV
370kb
nonScXV - nonScVIII
0kb 500kb 1000kb
Sc/nonSc Chimera Chromosomes
nonScIII - ScIII
200kb
nonScV - ScV
450kb
ScVII - nonScVII
200kb
ScVIII - nonScVIII
445kb
ScX - nonScX
710kb
ScX - nonScX
450kb
ScXI - nonScXI
330kb
nonScXIII - ScXIII
880kb
ScXV - nonScXV
980kb
ScXVI - nonScXVI - ScXVI
860kb 925kb
ScXVI - nonScXVI - ScXVI
96kb 925kb
0kb 500kb 1000kb

Fig. 2

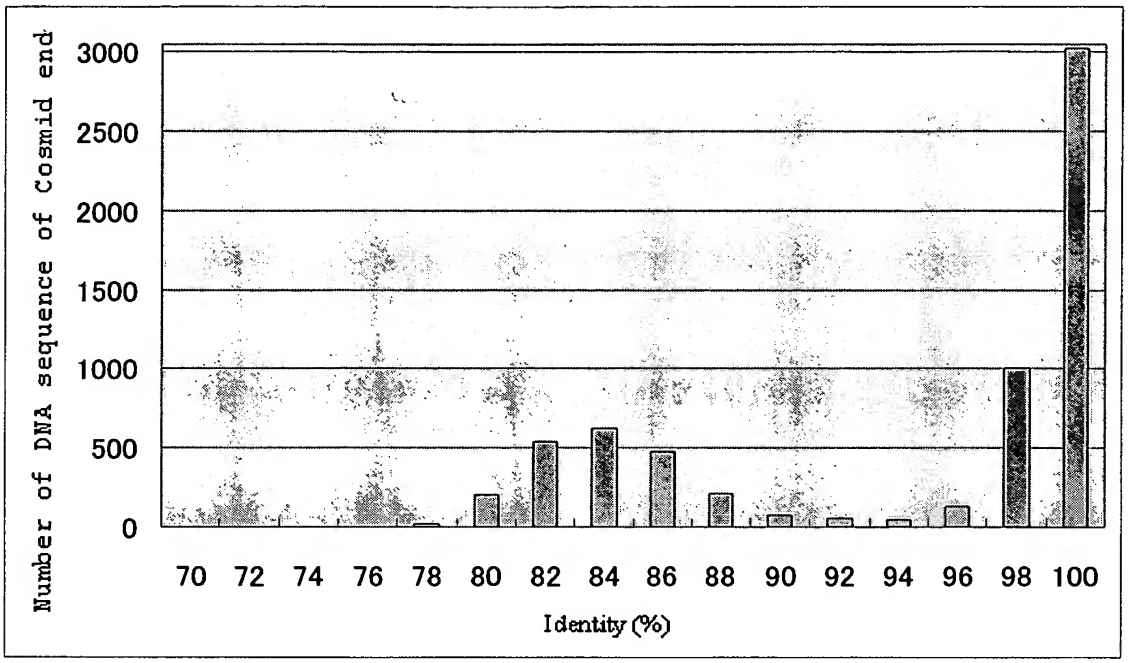

Number of DNA sequence of Cosmid end
3000
2500
2000
1500
1000
500
0
70 72 74 76 78 80 82 84 86 88 90 92 94 96 98 100
Identity (%)

Fig. 3

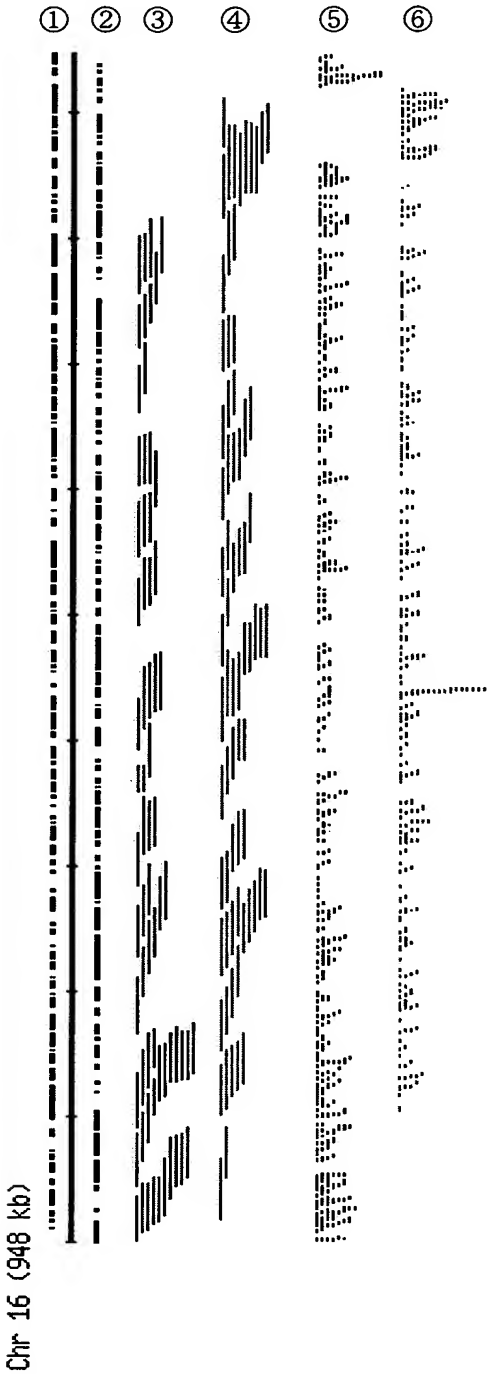


Fig. 4

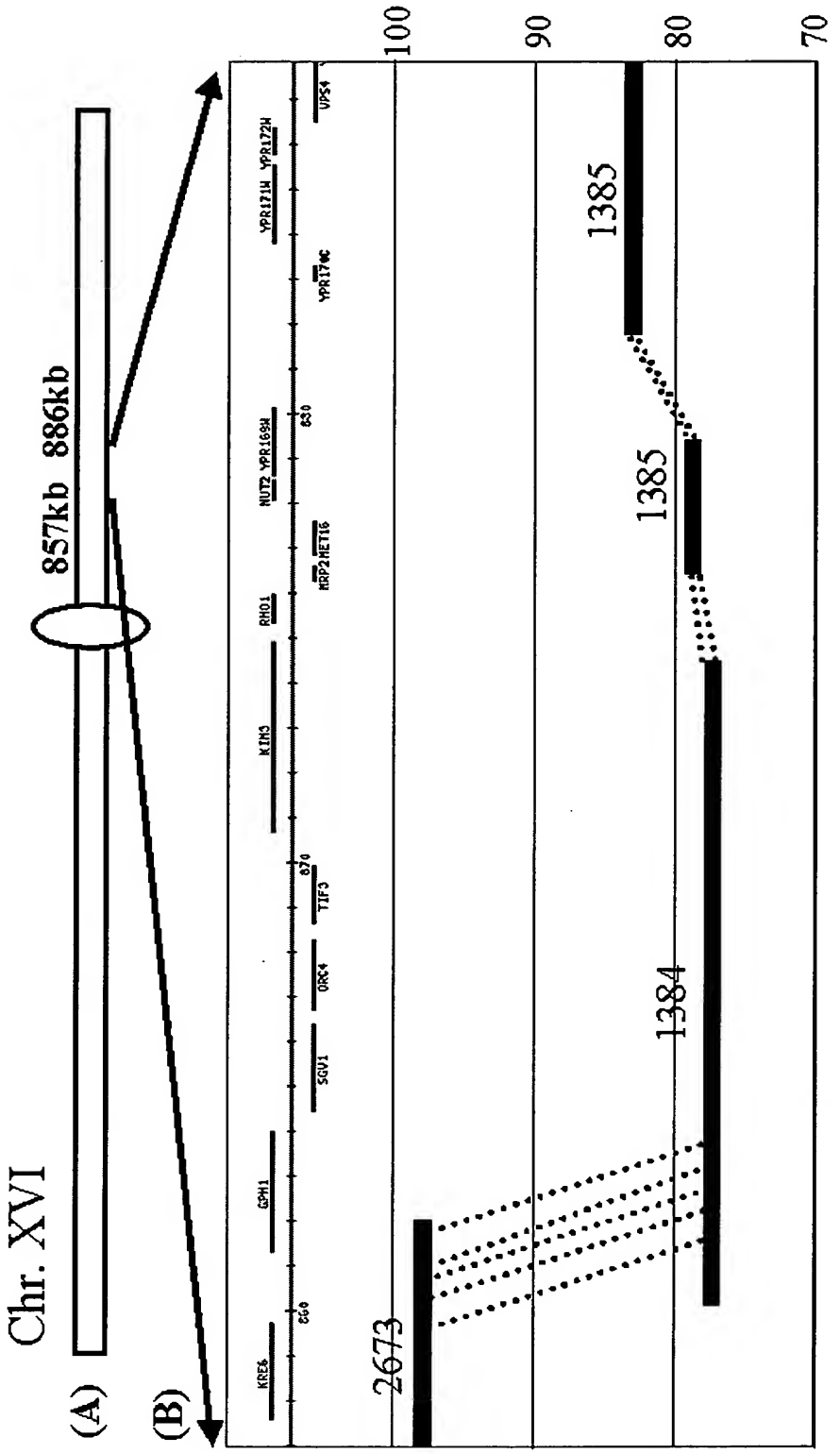

Chr. XVI
857kb
886kb
(A)
(B)
100
90
80
70
1385
1385
1384
2673
VPS4
YPR171W
YPR172W
YPR170C
NUT2
YPR169W
MRP2
MET16
RHO1
KIN3
TIF3
ORC4
SGV1
GPH1
KRE6
830
870
910

Fig. 5

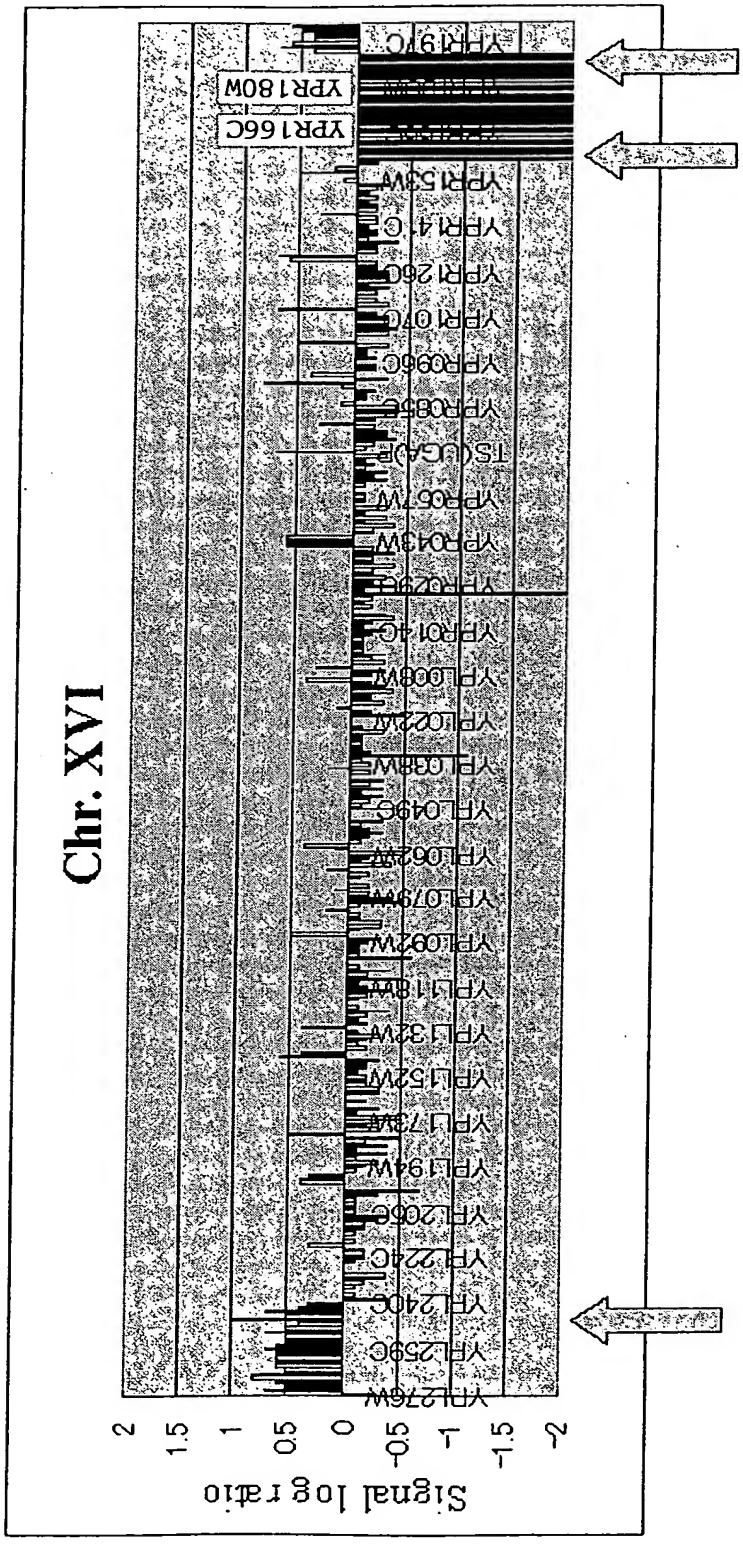


Fig. 6

COPY

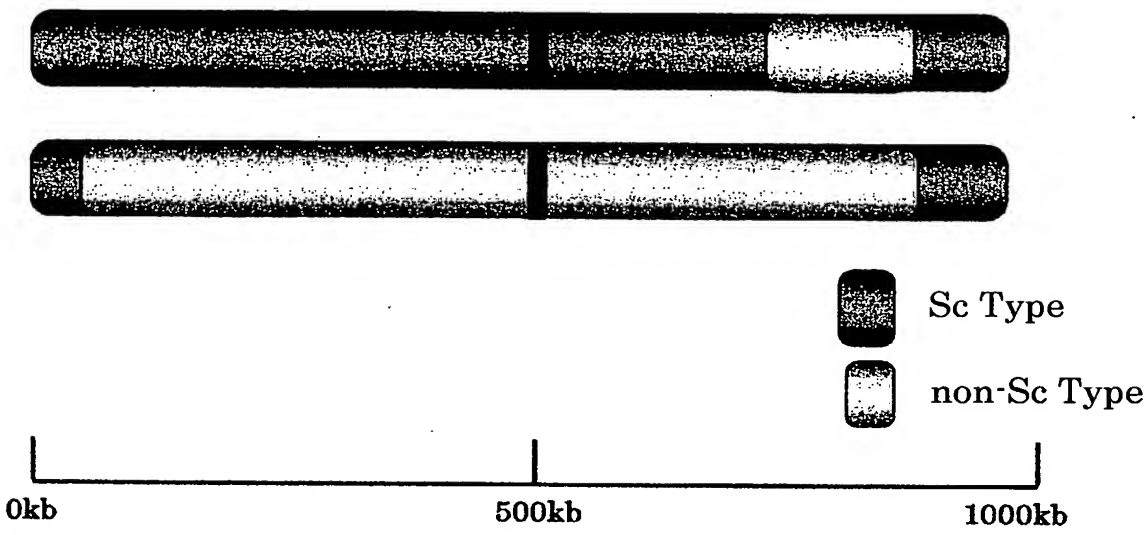
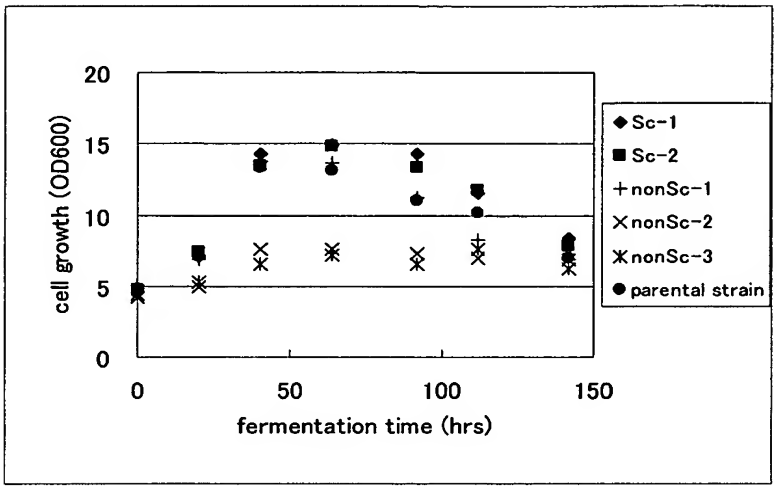
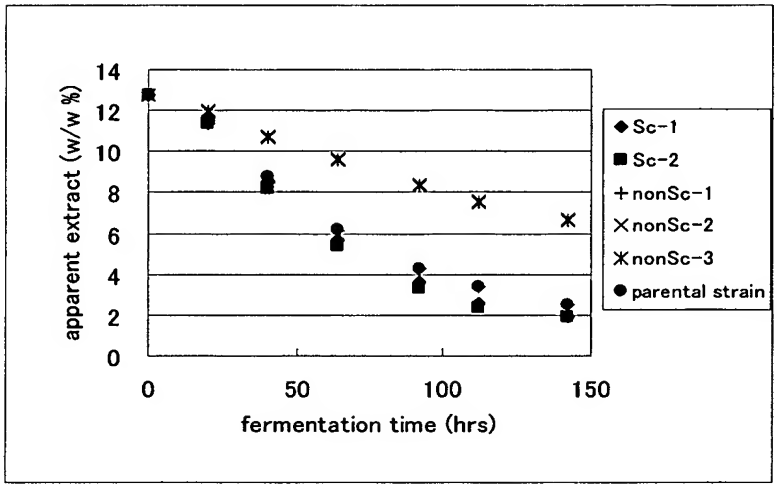


Fig. 7

(a)


cell growth (OD600)
20
15
10
5
0
0
50
100
150
fermentation time (hrs)
Sc-1
Sc-2
nonSc-1
nonSc-2
nonSc-3
parental strain

(b)


apparent extract (w/w %)
14
12
10
8
6
4
2
0
0
50
100
150
fermentation time (hrs)
Sc-1
Sc-2
nonSc-1
nonSc-2
nonSc-3
parental strain

(c)

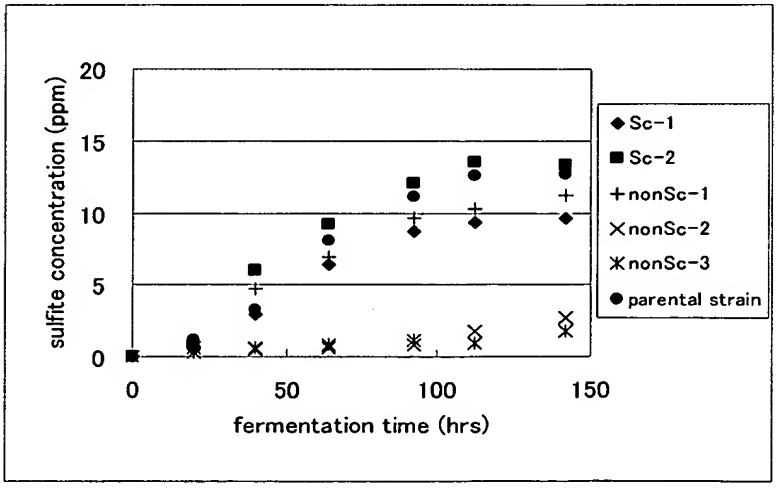
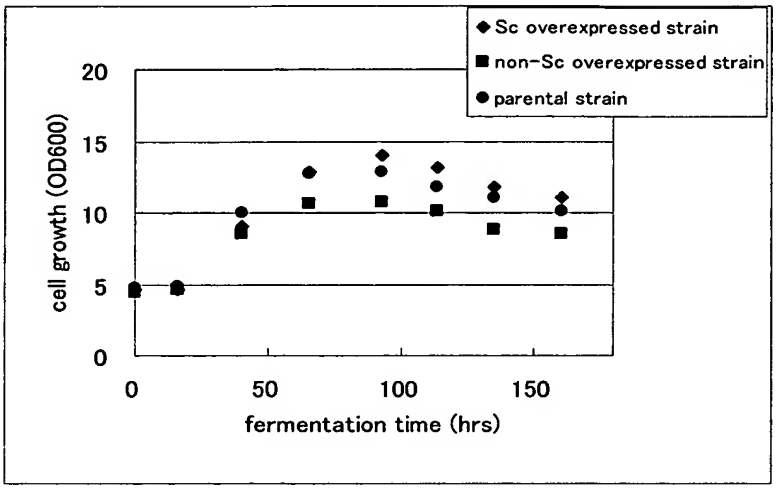
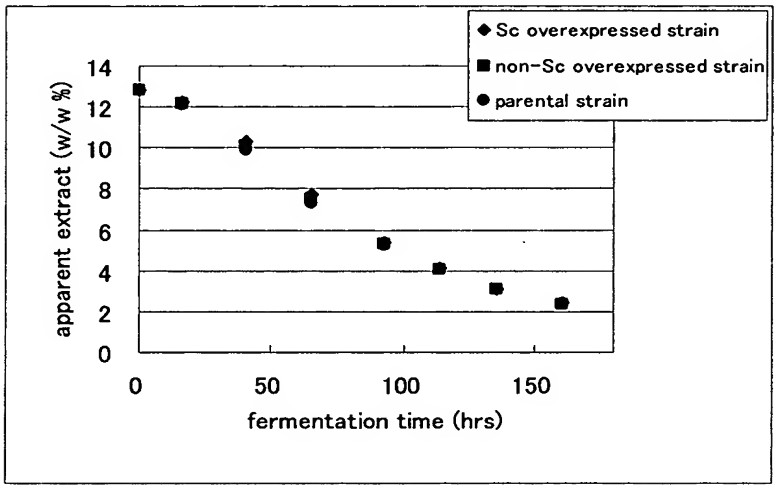

sulfite concentration (ppm)
20
15
10
5
0
0
50
100
150
fermentation time (hrs)
Sc-1
Sc-2
nonSc-1
nonSc-2
nonSc-3
parental strain

Fig. 8

(a)


◆ Sc overexpressed strain
■ non-Sc overexpressed strain
● parental strain
cell growth (OD600)
0
5
10
15
20
0
50
100
150
fermentation time (hrs)

(b)


◆ Sc overexpressed strain
■ non-Sc overexpressed strain
● parental strain
apparent extract (w/w %)
0
2
4
6
8
10
12
14
0
50
100
150
fermentation time (hrs)

(c)

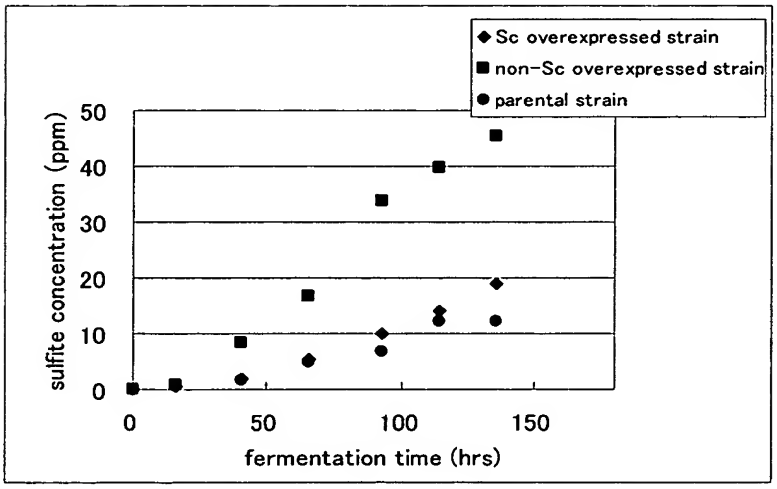

◆ Sc overexpressed strain
■ non-Sc overexpressed strain
● parental strain
sulfite concentration (ppm)
0
10
20
30
40
50
0
50
100
150
fermentation time (hrs)

Fig. 9

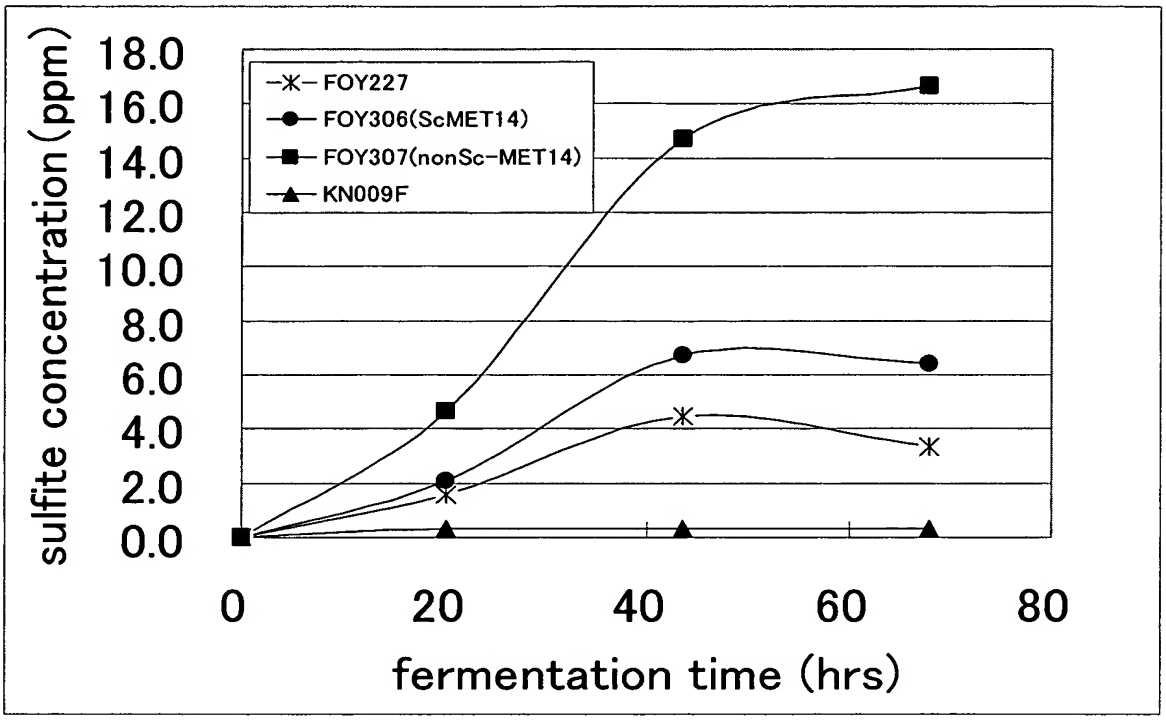

sulfite concentration (ppm)
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
FOY227
FOY306(ScMET14)
FOY307(nonSc-MET14)
KN009F
0
20
40
60
80
fermentation time (hrs)

Fig. 10

ScSSU1

```
   1 atggttgcca attgggtact tgctcttacg aggcagtttg acccctttcat
  51 gtttatgatg gtcatgggtg tcggcatttc atcgaatatt ctatatagct
 101 tcccatatcc tgcaaggtgg ctaagaatat gctcctacat catgtttgct
 151 atcacttgcc ttatttttcat tgctgtgcag gcactacaaa tattacattt
 201 gattgtctat attaaggaga aaagcttcag agaatatttt aatgacttttt
 251 tcagaaatat gaagcacagt ttatttgggg gtacttatcc catggggtta
 301 gttacaatta taaatttctt aggagcactc tcgaaagcga acacgacgaa
 351 gagccccact aattccagaa atttgatgat atttgtttac gtcttgtggt
 401 ggtatgatct cgcagtctgt ctagtaatag cgtgggggtat ctcgtttctc
 451 atctggcatg actattactc tttggaaggg attgggaatc atccttcata
 501 taatatcaaa atggcatccg aaaacatgaa aagtgtattg ctactggata
 551 tcatttcgct ggttgtcgtc gctttcaagtt gtggaacatt cacaatgtca
 601 gaaatattct tccatgcgtt taatagaaat atttcaactga taacgttggt
 651 catatgtgcc ttaacgtggc tgcatgccat tatcttcgtc ttcatactga
 701 ttgcgatata cttctggagt ctttatatta ataagatacc accaatgaca
 751 caggttttca ccttattcct gcttttgggc ccgatgggcc aaggaagtty
 801 tggagtctta ttgcttacag ataatataaa aaaatatgcg ggcaaatatt
 851 acccaacaga taacattaca agagaacaag agatattgac tattgcagtt
 901 ccatggtgtt tcaaaattct aggcatggtt tctgctatgg cattgctcgc
 951 tatgggctat ttttttcaccg tgatttctgt cgtttcaatc ctgtcgtact
1001 acaataaaaa agagattgaa aacgagacag gaaaagtgaa gagagtttat
1051 accttccaca aaggtttttg ggggatgact ttcccgatgg gtactatgtc
1101 tttaggaaac gaagagttat atgtgcagta taaccagtac gttcccttat
1151 atgcatttag agtcctagga accatatacg gcggtgtttg cgtttgttgg
1201 tcaattctat gcctttttatg cacattgcat gagtatttcta aaaagatgct
1251 gcatgctgcc cgtaaatctt cattattttc agagtcaggt acggaaaaga
1301 cgacagtttc tccgtataac agcattgaaa gcgtggaaga atcaaactcg
1351 gctctagatt ttacgcgttt agcataa
```

nonScSSU1

```
   1 atggtcgcta gttggatgct cactgccaca agggatttca acccttttcat
  51 gtttgtcatg gttatggggg tcggtatttc atcgaatatt ctgtacagct
 101 tcccgtatcc ggcgaggtgg ctgaggatat gctcgtacat catgtttgcc
 151 attacatgtt tgattttcat ctctgtacag gcgctgcagc ttttgcacat
 201 ggtcatctat atcaaagaaa aaagctttag agattactic aatgaatatt
 251 tcagaagtct gaagtacaat ttatttiggg gtacttatcc catgggatta
 301 gtaacaatca taaatttttt gggggcgctg tcacaaaaat ttaccacgac
 351 aagccctgcg aatgccaagc acttgatcat ttttgtttac gtcctgtggt
 401 ggtatgacct cgcggtttgt ttagtaaccg ctttgggggat ttcatttcctc
 451 atctggcaaa agtactactt cgtggacggg gttggaaatc actcttcata
 501 cagttcacga atggcttccg accacatgaa aagcgtactg ttgctagata
 551 tcatttccgct ggtcgttgtc gcttcgagcg gtgggacatt tacaatgtca
 601 aaaatattcg gtaccacttt tgataggaat attcaattgc taacactggt
 651 catctgtgcc ctggtttggc tacacgcttt tatattttgtc tttattctga
 701 ttacaatata cttctggaat ctttacatca ataagatacc accaatgacg
 751 caggtattta cgttgttctt ggtattgggg ccattgggcc aaggaagttt
 801 tggtatttig ttgcttactg acaatataag aaagtatgta gaaaaatact
 851 acccaaggga aaacatcacc atggaacaag aaatactaac cattatggtt
 901 ccgtggtgtt tcaaggttct gggcatgaca tttgctttgg cattaatcgc
 951 tatgggttac ttctttacgg taatttccct tatttcgatt ttatcatact
1001 acaatgaaag agttgttgac aatgaaacag gcaaagtgaa aaggatctac
1051 actttccata aaggtttctg ggggatgact ttcccgatgg gtaccatgtc
1101 tttgggaaac gaggagctgt atctgcaata caaccagtat gttcccttat
1151 atgcattcag agtcatagct accatatatg gtggtattig tgttigctgg
1201 tcaatcttat gcctctcgtg cacgttgtat ggttacctga aaacgatttct
1251 ccatgctgcc cgtaaaccit cgttttiatc agaggaaggg acggagaaga
1301 ctgtcaattc tccttttcaac agcatcgaaa gtgtggagga atcaaactcg
1351 gctatcgata gtacatattt aacataa
```

Fig. 11

ScMET14

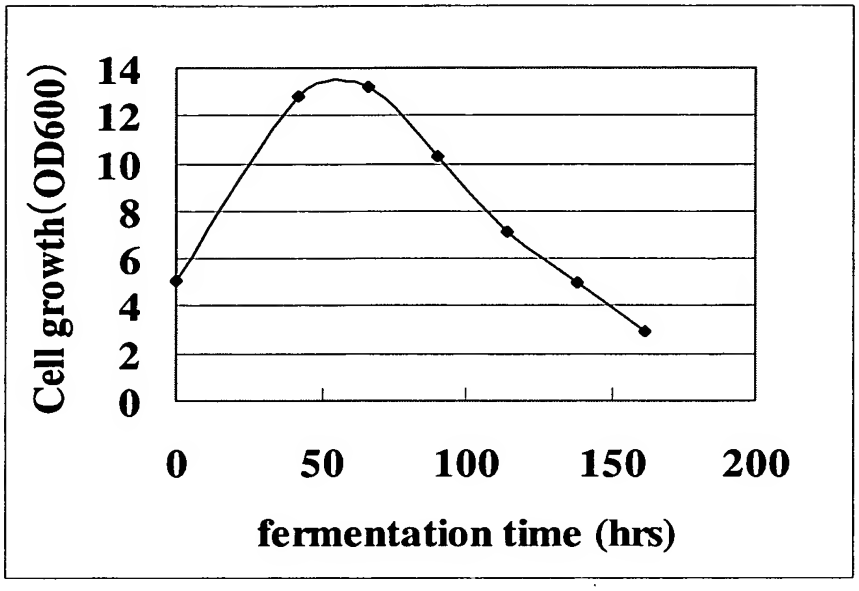
```
   1  atggctacta atattacttg gcatccaaat cttacttacg acgaacgcaa
  51  ggcattgaga aaacaggacg gttgtactat ttggttaaca ggtctaagtg
 101  cgtcaggtaa aagtacaatc gcctgtgcgc tagaacagtt actgctccaa
 151  aaaaacttgt ctgcatatag attggatggt gacaacattc gttttggatt
 201  gaacaaggat ttgggtttct cagaaaagga cagaaatgaa aacattcgta
 251  gaattagcga agtttctaag ctatttgctg attcatgtgc tatttcaatc
 301  acctcattta tctctccata cagagttgac agagatagag ctcgtgaact
 351  acataaggag gctggtttga agttcattga aatatttgtt gatgttccat
 401  tagaagtcgc tgagcaaagg gaccctaagg gtttatacaa gaaagctagg
 451  gagggtgtaa tcaaggagtt tacaggtatt tctgccccat atgaagcgcc
 501  aaaagctcca gagctacatt tgagaaccga ccagaagacg gttgaagaat
 551  gtgctaccat tatttatgag tacttaatca gtgaaaaaat catccgtaag
 601  catttgtaa
```

nonScMET14

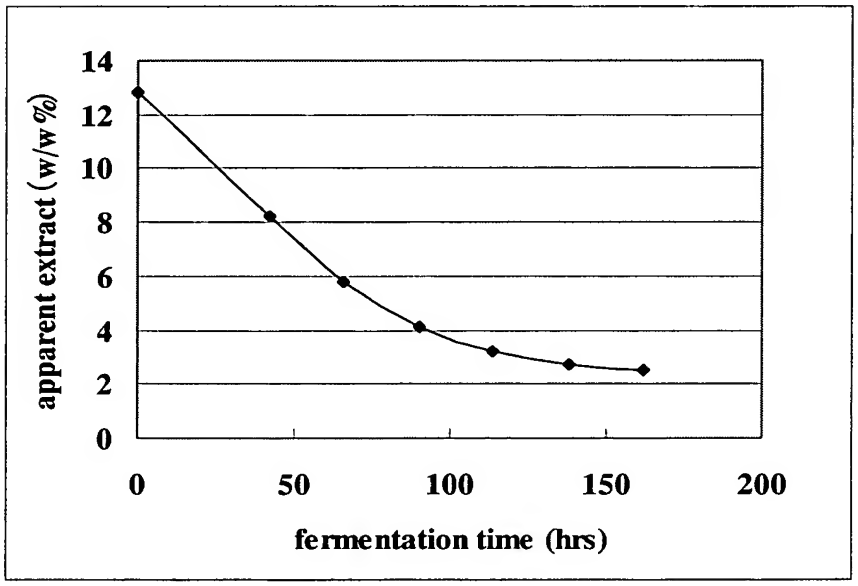
```
   1  atggctacta atatcacttg gcatccaaat cttacctacg acgaacgtaa
  51  ggaattaaga aagcaagacg gctgtaccgt ttggttgacc ggtctaagtg
 101  cgtcaggaaa aagtacaata gcttgtgcac tggaacaatt actgcttcaa
 151  aaaaacttat ctgcttatag gttagatggt gataacattc gttttggttt
 201  gaataaggat ttgggcttct cagaaaagga cagaaatgaa aacattcgta
 251  gaattagtga agtatccaag ctattcgctg attcgtgtgc tgtatccatc
 301  acttcattta tttccccata cagagtcgat agagacagag cccgtgattt
 351  acataaggaa gcaggcttga agttcattga aattttgtt gatgttccat
 401  tagaagtcgc tgagcaaaga gaccctaagg gtttgtataa gaaagccaga
 451  gaaggtgtga ttaaagagtt cactggtatt tcagctcctt acgaagctcc
 501  aaaggcccca gagttgcatt taagaactga ccaaaagact gttgaagaat
 551  gtgctgctat catttatgag tacctggtca atgagaagat tatccggaag
 601  catctataa
```

Fig. 12

(a)


Cell growth(OD600)
14
12
10
8
6
4
2
0
0
50
100
150
200
fermentation time (hrs)

(b)


apparent extract (w/w%)
14
12
10
8
6
4
2
0
0
50
100
150
200
fermentation time (hrs)